

CLAIMS

1. A recording method, comprising the steps of:

5 (a) generating a plurality of pulse sequences corresponding to a plurality of linear velocities;

(b) while rotating a recording medium with a linear velocity selected from the plurality of linear velocities, forming at least one of a recording mark and a space by irradiating the recording medium with a pulse sequence selected from the plurality of pulse sequences, the pulse sequence corresponding to the linear velocity,

wherein the step (a) comprises the steps of:

(a-1) measuring at least one first recording parameter corresponding to at least one linear velocity selected from the plurality of linear velocities;

(a-2) determining a second recording parameter corresponding to the plurality of linear velocities based on the at least one first recording parameter measured; and

20 (a-3) generating the plurality of pulse sequences corresponding to the plurality of linear velocities based on the second recording parameter measured.

2. A recording method according to claim 1, wherein the step (a-1) comprises the step of:

25 measuring the at least one first recording parameter by performing recording parameter learning for learning a recording parameter corresponding to a pulse sequence, wherein the pulse sequence is used for forming a desired recording mark onto the recording medium.

3. A recording method according to claim 2, wherein:

each of the plurality of pulse sequences comprises

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a starting pulse and a terminating pulse, the starting pulse being provided at a beginning thereof and the terminating pulse being provided at the end thereof;

the starting pulse is used for forming a starting
5 portion of the recording mark;

the terminating pulse is used for forming a terminating portion of the recording mark;

the second recording parameter indicates a recording power level of each of the plurality of pulse sequences, a recording power level coefficient for determining a recording power level of each of the plurality of pulse sequences, a position of the starting pulse of each of the plurality of pulse sequences, and a position of the terminating pulse of each of the plurality of pulse sequences.

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4. A recording method according to claim 1, wherein:

the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity; and

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the at least one linear velocity is the first linear velocity v_a .

5. A recording method according to claim 1, wherein:

the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity; and

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the at least one linear velocity is the second linear velocity v_b .

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6. A recording method according to claim 1, wherein:

the plurality of linear velocities are linear

velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity; and
the at least one linear velocity is $(v_a + v_b)/2$.

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7. A recording method according to claim 1, wherein:

the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity;

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the at least one linear velocity is a linear velocity v_1 and a linear velocity v_2 ; and

the first linear velocity v_a , the second linear velocity v_b , the linear velocity v_1 , and the linear velocity v_2 have a relationship $v_a \leq v_1 < v_2 \leq v_b$.

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8. A recording method according to claim 1, wherein:

the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity; and

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the at least one linear velocity is a first linear velocity v_a and a second linear velocity v_b .

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9. A recording method according to claim 1, wherein:

the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity;

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the at least one linear velocity is a linear velocity v_1 , a linear velocity v_2 , and a linear velocity v_3 ; and

the first linear velocity v_a , the second linear velocity v_b , the linear velocity v_1 , the linear velocity

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v_2 , and the linear velocity v_3 have a relationship $v_a \leq v_1 < v_2 < v_3 \leq v_b$.

10. A recording method according to claim 1, wherein:

5 the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity;

10 the at least one linear velocity is a first linear velocity v_a , a second linear velocity v_b , and a third linear velocity v_c ; and

 the first linear velocity v_a , the second linear velocity v_b , and the third linear velocity v_c have a relationship $v_c = (v_a + v_b) / 2$.

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11. A recording method according to claim 1, wherein the step (a-2) comprises the steps of:

20 determining a fourth recording parameter corresponding to the plurality of linear velocities based on at least one third recording parameter recorded on the recording medium; and

 determining the second parameter based on the at least one first recording parameter measured and the fourth recording parameter.

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12. A recording method according to claim 11, wherein the first recording parameter, the second recording parameter, the third recording parameter, and the fourth recording parameter have a relationship represented by:

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$g(v) = f(v) + PMv_1 - f(v_1) + Adj(v),$

where:

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v represents the plurality of linear velocities;
v1 represents a linear velocity corresponding to one
of the at least one third recording parameter;

g(v) represents the second recording parameter
5 corresponding to the plurality of linear velocities;

f(v) represents the fourth recording parameter
corresponding to the plurality of linear velocities;

PMv1 represents the first recording parameter; and

Adj(v) represents an adjustment value corresponding
10 to the plurality of linear velocities.

13. A recording method according to claim 12, wherein:

the plurality of linear velocities are linear
velocities continuously ranging from a first linear velocity
15 va, which is a lowest linear velocity, to a second linear
velocity vb, which is a highest linear velocity;

the at least one third recording parameter is a
recording parameter corresponding to a linear velocity v1
of the plurality of linear velocities and a recording
20 parameter corresponding to a linear velocity v2 of the
plurality of linear velocities; and

the first linear velocity va, the second linear
velocity vb, the linear velocity v1, and the linear velocity
v2 have a relationship $va \leq v1 < v2 \leq vb$.

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14. A recording method according to claim 12, wherein:

the plurality of linear velocities are linear
velocities continuously ranging from a first linear velocity
va, which is a lowest linear velocity, to a second linear
30 velocity vb, which is a highest linear velocity; and

the at least one third recording parameter is a
recording parameter corresponding to the first linear
velocity va and a recording parameter corresponding to the

second linear velocity vb.

15. A recording method according to claim 12, wherein:

5 the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity va, which is a lowest linear velocity, to a second linear velocity vb, which is a highest linear velocity;

10 the at least one third recording parameter is a recording parameter corresponding to a linear velocity v1 of the plurality of linear velocities, a recording parameter corresponding to a linear velocity v2 of the plurality of linear velocities, and a recording parameter corresponding to a linear velocity v3 of the plurality of linear velocities; and

15 the first linear velocity va, the second linear velocity vb, the linear velocity v1, the linear velocity v2, and the linear velocity v3 have a relationship $va \leq v1 < v2 < v3 \leq vb$.

20 16. A recording method according to claim 12, wherein:

the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity va, which is a lowest linear velocity, to a second linear velocity vb, which is a highest linear velocity;

25 the at least one third recording parameter is a recording parameter corresponding to the first linear velocity va, a recording parameter corresponding to the second linear velocity vb, and a recording parameter corresponding to a linear velocity vc of the plurality of linear velocities; and

30 the first linear velocity va, the second linear velocity vb, and the third linear velocity vc have a relationship $vc = (va + vb) / 2$.

17. A recording method according to claim 12, wherein $f(v)$ is a linear function or a quadratic function.

- 5 18. A recording method according to claim 12, wherein:
the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity;
10 the at least one third recording parameter is a recording parameter $PCv1$ corresponding to a linear velocity $v1$ of the plurality of linear velocities and a recording parameter $PCv2$ corresponding to a linear velocity $v2$ of the plurality of linear velocities; and
15 the following relationship is satisfied:

$$\begin{aligned} v_a \leq v1 < v2 \leq v_b, \\ f(v) = \alpha \cdot (v - v1) + PCv1, \text{ and} \\ \alpha = (PCv2 - PCv1) / (v2 - v1). \end{aligned}$$

- 20 19. A recording method according to claim 12, where the at least one third recording parameter is selected based on an identification code recorded on the recording medium.
- 25 20. A recording method according to claim 1, wherein:
the at least one linear velocity of the plurality of linear velocities is at least one linear velocity corresponding to at least one third recording parameter; and
30 the step (a-2) comprises the step of determining a second recording parameter $h(v)$ corresponding to the plurality of linear velocities v based on the at least one first recording parameter measured.

21. A recording method according to claim 20, wherein:
the plurality of linear velocities are linear
velocities continuously ranging from a first linear velocity
5 va, which is a lowest linear velocity, to a second linear
velocity vb, which is a highest linear velocity;
at least one linear velocity of the plurality of
linear velocities is a linear velocity v1 and a linear velocity
v2; and
10 the first linear velocity va, the second linear
velocity vb, the linear velocity v1, and the linear velocity
v2 have a relationship $va \leq v1 < v2 \leq vb$.
22. A recording method according to claim 20, wherein:
15 the plurality of linear velocities are linear
velocities continuously ranging from a first linear velocity
va, which is a lowest linear velocity, to a second linear
velocity vb, which is a highest linear velocity; and
at least one linear velocity of the plurality of
20 linear velocities is the first linear velocity va and the
second linear velocity vb.
23. A recording method according to claim 20, wherein:
the plurality of linear velocities are linear
25 velocities continuously ranging from a first linear velocity
va, which is a lowest linear velocity, to a second linear
velocity vb, which is a highest linear velocity;
at least one linear velocity of the plurality of
linear velocities is a linear velocity v1, a linear velocity
30 v2, and a linear velocity v3; and
the first linear velocity va, the second linear
velocity vb, the linear velocity v1, the linear velocity
v2, and the linear velocity v3 have a relationship

$$va \leq v1 < v2 < v3 \leq vb.$$

24. A recording method according to claim 20, wherein:

5 the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity va , which is a lowest linear velocity, to a second linear velocity vb , which is a highest linear velocity;

10 at least one linear velocity of the plurality of linear velocities is the first linear velocity va , the second linear velocity vb , and the linear velocity vc ; and

the first linear velocity va , the second linear velocity vb , and the third linear velocity vc have a relationship $vc = (va + vb) / 2$.

15 25. A recording method according to claim 20, wherein $h(v)$ is a linear function or a quadratic function.

26. A recording method according to claim 20, wherein:

20 the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity va , which is a lowest linear velocity, to a second linear velocity vb , which is a highest linear velocity;

25 the at least one first recording parameter is a recording parameter $PMv1$ corresponding to a linear velocity $v1$ of the plurality of linear velocities and a recording parameter $PMv2$ corresponding a linear velocity $v2$ of the plurality of linear velocities; and

the following relationship is satisfied:

30 $va \leq v1 < v2 \leq vb$,
 $h(v) = \beta \cdot (v - va) + PMv1$, and
 $\beta = (PMv2 - PMv1) / (v2 - v1)$.

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27. A recording method according to claim 20, wherein the at least one third recording parameter is selected based on an identification code recorded on the recording medium.

5 28. A recording method according to claim 3, wherein:

the recording power level coefficient is at least one of a coefficient for determining an erase power level of an erase pulse forming the space based on a peak power level of a peak pulse contained in a pulse sequence, and
10 a coefficient for determining a bias power level of a bias pulse forming the recording mark based on the peak power level of the peak pulse contained in the pulse sequence; and

the bias power level is between the peak power level
15 and the erase power level.

29. A recording method according to claim 12, wherein:

each of the plurality of pulse sequences comprises a starting pulse and a terminating pulse, the starting pulse
20 being provided at a beginning thereof and the terminating pulse being provided at the end thereof;

the recording mark is a shortest recording mark;
the starting pulse and the terminating pulse are pulses forming the shortest recording mark; and

25 Adj(v) is determined based on a position of at least one of the starting pulse and the terminating pulse.

30. A recording medium for recording information, wherein:

at least one of a recording mark and a space is formed
30 on the recording medium by, while rotating the recording medium with a linear velocity selected from the plurality of linear velocities, irradiating the recording medium with a pulse sequence selected from the plurality of pulse

sequences, the pulse sequence corresponding to the linear velocity;

the plurality of pulse sequences correspond to the plurality of linear velocities;

5 at least one first recording parameter corresponding to at least one linear velocity of the plurality of linear velocities is measured;

10 a fourth recording parameter corresponding to the plurality of linear velocities is determined based on at least one third recording parameter recorded on the recording medium;

 a second parameter is determined based on the at least one first recording parameter measured and the fourth recording parameter;

15 the plurality of pulse sequences corresponding to the plurality of linear velocities are generated based on the determined second recording parameter;

 the recording medium has a region, in which the third recording parameter is recorded;

20 the first recording parameter, the second recording parameter, the third recording parameter, and the fourth recording parameter have a relationship represented by:

$$g(v)=f(v)+PMv_1-f(v_1)+Adj(v)$$

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where:

 v represents the plurality of linear velocities;
 v₁ represents a linear velocity corresponding to one of the at least one third recording parameter;

30 g(v) represents the second recording parameter corresponding to the plurality of linear velocities;

 f(v) represents the fourth recording parameter corresponding to the plurality of linear velocities;

PMv1 represents the first recording parameter; and
Adj(v) represents an adjustment value corresponding
to the plurality of linear velocities.

5 31. A recording medium for recording information, wherein:
 at least one of a recording mark and a space is formed
 on the recording medium by, while rotating the recording
 medium with a linear velocity selected from the plurality
 of linear velocities, irradiating the recording medium with
10 a pulse sequence selected from the plurality of pulse
 sequences, the pulse sequence corresponding to the linear
 velocity;

 the plurality of pulse sequences correspond to the
 plurality of linear velocities;

15 at least one first recording parameter corresponding
 to at least one linear velocity of the plurality of linear
 velocities is measured;

 at least one linear velocity of the plurality of
 linear velocities is at least one linear velocity
20 corresponding to at least one third recording parameter
 recorded on the recording medium;

 a second recording parameter corresponding to the
 plurality of linear velocities is determined based on the
 at least one first recording parameter measured;

25 the plurality of pulse sequences corresponding to
 the plurality of linear velocities are generated based on
 the second recording parameter measured; and

 the recording medium has a region, in which the third
 recording parameter is recorded.

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32. A recording medium according to claim 30, wherein the
 recording medium has a region, in which an identification
 code for selecting the at least one third recording parameter

is recorded.

33. A recording medium according to claim 31, wherein the recording medium has a region, in which an identification code for selecting the at least one third recording parameter is recorded.

34. A recording apparatus, comprising:
means for generating a plurality of pulse sequences corresponding to a plurality of linear velocities;
means for, while rotating a recording medium with a linear velocity selected from the plurality of linear velocities, forming at least one of a recording mark and a space by irradiating the recording medium with a pulse sequence selected from the plurality of pulse sequences, wherein the forming means comprises:
means for measuring at least one first recording parameter corresponding to at least one linear velocity selected from the plurality of linear velocities;
means for determining a second recording parameter corresponding to the plurality of linear velocities based on the at least one first recording parameter measured; and
means for generating the plurality of pulse sequences corresponding to the plurality of linear velocities based on the second recording parameter measured.

35. A recording apparatus according to claim 34, wherein:
the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity; and

the at least one linear velocity is a first linear velocity v_a and a second linear velocity v_b .

36. A recording apparatus according to claim 34, wherein:
5 at least one linear velocity of the plurality of linear velocities is at least one linear velocity corresponding to at least one third recording parameter recorded on the recording medium;

10 the second recording parameter determining means determines a second recording parameter $h(v)$ corresponding to the plurality of linear velocities v based on the at least one first recording parameter measured;

15 the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity;

20 at least one linear velocity of the plurality of linear velocities corresponding to the at least one third recording parameter is a linear velocity v_1 and a linear velocity v_2 ; and

 the first linear velocity v_a , the second linear velocity v_b , the linear velocity v_1 , and the linear velocity v_2 have a relationship $v_a \leq v_1 < v_2 \leq v_b$.

25 37. A recording apparatus according to claim 34, wherein:
 at least one linear velocity of the plurality of linear velocities is at least one linear velocity corresponding to at least one third recording parameter recorded on the recording medium;

30 the second recording parameter determining means determines a second recording parameter $h(v)$ corresponding to the plurality of linear velocities v based on the at least one first recording parameter measured;

the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity; and

5 the at least one linear velocity corresponding to the at least one third recording parameter is the first linear velocity v_a and the second linear velocity v_b .

38. A recording apparatus according to claim 34, wherein:

10 at least one linear velocity of the plurality of linear velocities is at least one linear velocity corresponding to at least one third recording parameter recorded on the recording medium;

15 the second recording parameter determining means determines a second recording parameter $h(v)$ corresponding to the plurality of linear velocities v based on the at least one first recording parameter measured; and

$h(v)$ is a linear function or a quadratic function.

20 39. A recording apparatus according to claim 34, wherein:

at least one linear velocity of the plurality of linear velocities is at least one linear velocity corresponding to at least one third recording parameter recorded on the recording medium;

25 the second recording parameter determining means determines a second recording parameter $h(v)$ corresponding to the plurality of linear velocities v based on the at least one first recording parameter measured;

30 the plurality of linear velocities are linear velocities continuously ranging from a first linear velocity v_a , which is a lowest linear velocity, to a second linear velocity v_b , which is a highest linear velocity;

the at least one first recording parameter is a

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recording parameter PMv1 corresponding to a linear velocity v1 of the plurality of linear velocities and a recording parameter PMv2 corresponding a linear velocity v2 of the plurality of linear velocities; and

5 the following relationship is satisfied:

$$v_a \leq v_1 < v_2 \leq v_b,$$

$$h(v) = \beta \cdot (v - v_a) + PMv_1, \text{ and}$$

$$\beta = (PMv_2 - PMv_1) / (v_2 - v_1).$$